



# North Dakota State Water Commission

900 EAST BOULEVARD AVENUE, DEPT 770 • BISMARCK, NORTH DAKOTA 58505-0850  
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September 30, 2011

North Dakota Department of Health  
Division of Water Quality  
918 East Divide Avenue  
Bismarck, ND – 58501-1947

RE: August 2011 West End Devils Lake Outlet Monthly Discharge and Water Quality Reports

Enclosed are the monthly discharge reports for the Devils Lake Outlet for the month of August 2011 and the summaries of the sample results and flow data.

The outlet was limited by pump failures throughout the reported period and by flooding on the Sheyenne River August 2 through August 8, 2011. Because of the maintenance issues, sample frequency inadvertently was reduced during the reported period.

Attached to the summaries are tables showing average daily outlet discharge, water quality results from samples collected from outlet, the upstream and the downstream location, average daily stream flow data and conductivity data obtained from the USGS gaging station at the upstream and the downstream location.

Included in the July 2011 report, a preliminary sulfate concentration result of 103 milligrams per liter (mg/L) was erroneously reported for a sample that was collected from the outlet on July 28, 2011. The final result for the sample is 513 mg/L.

If you have any questions, please contact me at 701-328-4948.

Sincerely,

Jonathan Kelsch P.E.  
Head, Construction Section  
JK:MSW:416-10

OUTLET OPERATOR NAME/ADDRESS

NAME: ND State Water Commission  
 ADDRESS: 900 E Boulevard Avenue,  
 Bismarck ND 58505

MONTHLY DISCHARGE REPORT

LOCATION: AT OUTLET

FACILITY: Devils Lake Outlet Project

MONITORING PERIOD	
START DATE	END DATE
8/1/11	8/31/11

LOCATION: Benson Co, ND

Devils Lake Outlet discharged 6,117 ac-ft over 31 Days

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.51	8.84	8.67	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	NA	NA	NA	umho/cm	Continuous	Recorder
SULFATE	507	547	520	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	511	547	524	mg/L	4 x Week	GRAB
OUTLET DISCHARGE	0.8	196	99	cfs	Continuous	Recorder
SIGNATURE				9/30/11	701-328-4948	
NAME AND TITLE	JONATHAN KELSCH, HEAD, CONSTRUCTION SECTION			DATE	TELEPHONE NUMBER	
COMMENT AND EXPLANATION OF ANY VIOLATIONS						
Summary of individual sample results and flow data for outlet, upstream & downstream monitoring locations attached.						

NA - Not Available

**Daily Outlet Discharge**

<b>Date</b>	<b>Average Daily Outlet Discharge (cfs)</b>	<b>Total Daily Volume (cu-ft)</b>
8/1/11	185	15,950,687
8/2/11	134	11,585,785
8/3/11	3.3	285,218
8/4/11	1.6	136,643
8/5/11	1.4	123,681
8/6/11	1.4	120,678
8/7/11	0.8	73,430
8/8/11	27	2,329,864
8/9/11	196	16,901,868
8/10/11	187	16,153,270
8/11/11	175	15,161,073
8/12/11	182	15,682,354
8/13/11	190	16,433,321
8/14/11	189	16,349,202
8/15/11	162	14,016,706
8/16/11	130	11,193,332
8/17/11	130	11,267,103
8/18/11	134	11,608,805
8/19/11	132	11,406,671
8/20/11	116	10,051,708
8/21/11	73	6,342,289
8/22/11	73	6,286,884
8/23/11	72	6,249,880
8/24/11	72	6,245,353
8/25/11	74	6,365,151
8/26/11	73	6,269,997
8/27/11	76	6,523,811
8/28/11	74	6,375,092
8/29/11	74	6,380,512
8/30/11	72	6,246,946
8/31/11	73	6,341,145
<b>Total</b>		266,458,460
<b>Total</b>		1,993
<b>Total</b>		6,117
<b>Minimum</b>	0.8	cfs
<b>Maximum</b>	196	cfs
<b>Average</b>	99	cfs

cu-ft  
Mgal  
Ac-ft

**Water Quality Results of the samples collected at the outlet  
Devils Lake Outlet**

<b>Date</b>	<b>Time</b>	<b>Sampler</b>	<b>Average Daily EC from Outlet Telemetry (µS/cm)</b>	<b>Lab pH</b>	<b>Lab Sulfate (mg/L)</b>	<b>7 Day Rolling Average of Sulfate for the operating period (mg/L)</b>	<b>Total Suspended Solids (mg/L)</b>	<b>No. of days included in the 7 day Rolling average</b>
8/1/11	16:00	NDSWC	NA	8.62	507	516	--	7
8/2/11	9:10	NDSWC	NA	8.62	509	511	33	7
8/3/11	--	--	--	--	--	--	--	--
8/4/11	--	--	--	--	--	--	--	--
8/5/11	--	--	--	--	--	--	--	--
8/6/11	--	--	--	--	--	--	--	--
8/7/11	--	--	--	--	--	--	--	--
8/8/11	--	--	--	--	--	--	--	--
8/9/11	8:45	NDSWC	NA	8.51	525	525	--	7
8/10/11	16:15	NDSWC	NA	8.7	516	521	--	7
8/11/11	9:50	NDSWC	NA	8.73	510	517	--	7
8/12/11	8:50	NDSWC	NA	8.71	533	521	--	7
8/13/11	--	--	--	--	--	--	--	-
8/14/11	--	--	--	--	--	--	--	-
8/15/11	--	--	--	--	--	--	--	-
8/16/11	8:40	NDSWC	NA	8.69	514	518	16	7
8/17/11	--	--	--	--	--	--	--	-
8/18/11	--	--	--	--	--	--	--	-
8/19/11	--	--	--	--	--	--	--	-
8/20/11	--	--	--	--	--	--	--	--
8/21/11	--	--	--	--	--	--	--	--
8/22/11	--	--	--	--	--	--	--	--
8/23/11	9:20	NDSWC	NA	8.62	547	547	--	7
8/24/11	13:45	NDSWC	NA	8.84	532	540	--	7
8/25/11	14:00	NDSWC	NA	8.83	516	532	--	7
8/26/11	--	--	--	--	--	--	--	-
8/27/11	--	--	--	--	--	--	--	-
8/28/11	--	--	--	--	--	--	--	-
8/29/11	13:30	NDSWC	NA	8.72	519	529	--	7
8/30/11	8:45	NDSWC	NA	8.54	507	519	16	7
8/31/11	9:25	NDSWC	NA	8.53	524	517	--	7
<b>Minimum</b>				8.51	507	511	16	
<b>Maximum</b>				8.84	547	547	33	
<b>Average</b>				8.67	520	524	22	

NA - Not Available

OUTLET OPERATOR NAME/ADDRESS

NAME: ND State Water Commission  
 ADDRESS: 900 E Boulevard Avenue  
 Bismarck ND 58505

MONTHLY DISCHARGE REPORT

LOCATION: UPSTREAM OF THE OUTLET (FLORA)

FACILITY: Devils Lake Outlet Project  
 LOCATION: Benson Co, ND

MONITORING PERIOD	
START DATE	END DATE
8/1/11	8/31/11

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.11	8.44	8.36	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1,330	1,380	1,355	umho/cm	Continuous	Recorder
SULFATE	270	358	296	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	275	321	296	mg/L	4 x Week	GRAB
FLOW, INSTREAM	53	215	133	cfs	Continuous	Recorder
SIGNATURE				9/30/11	701-328-4948	
NAME AND TITLE				JONATHAN KELSCH, HEAD, CONSTRUCTION SECTION		
COMMENT AND EXPLANATION OF ANY VIOLATIONS Summary of individual sample results and flow data for outlet, upstream & downstream monitoring locations attached. Instream samples and measurements for this summary pertain only to time periods when outlet is actually operated. NA - Not Available						

NA - Not Available

**Average daily streamflow and conductivity data at the upstream location near Flora  
 USGS Gaging Station Data  
 Sheyenne River Above Devils Lake Outlet Near Flora**

<b>Date</b>	<b>Streamflow (cfs)</b>	<b>EC (µS/cm)</b>
8/1/11	134	1340
8/2/11	147	1330
8/3/11	154	1320
8/4/11	150	1310
8/5/11	147	1310
8/6/11	160	1310
8/7/11	191	1300
8/8/11	192	1350
8/9/11	181	1360
8/10/11	171	1360
8/11/11	160	1350
8/12/11	153	1350
8/13/11	181	1320
8/14/11	215	1350
8/15/11	214	1350
8/16/11	190	1370
8/17/11	167	1380
8/18/11	147	1380
8/19/11	130	1380
8/20/11	116	1380
8/21/11	106	1380
8/22/11	98	1380
8/23/11	92	1380
8/24/11	86	1380
8/25/11	80	1380
8/26/11	74	1380
8/27/11	68	1380
8/28/11	64	NA
8/29/11	60	NA
8/30/11	56	NA
8/31/11	53	NA
<b>Minimum</b>	53	1,300
<b>Maximum</b>	215	1,380
<b>Average</b>	133	1,354

NA - Not available

**Water Quality Results of the samples collected from the upstream location near Flora  
Sheyenne River Above Devils Lake Outlet Near Flora**

Date	Time	Sampler	USGS EC ( $\mu$ S/cm)	Lab pH	Lab Sulfate (mg/L)	7 Day Rolling Average of Sulfate for the operating period (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling average
8/1/11	16:15	NDSWC	1340	8.28	270	275	--	7
8/2/11	9:35	NDSWC	1330	8.44	273	275	107	7
8/3/11	--	--	--	--	--	--	--	--
8/4/11	--	--	--	--	--	--	--	--
8/5/11	--	--	--	--	--	--	--	--
8/6/11	--	--	--	--	--	--	--	--
8/7/11	--	--	--	--	--	--	--	--
8/8/11	--	--	--	--	--	--	--	--
8/9/11	9:00	NDSWC	1350	8.4	320	320	--	7
8/10/11	16:30	NDSWC	1350	8.39	305	313	--	7
8/11/11	10:05	NDSWC	1340	8.36	308	311	--	7
8/12/11	9:00	NDSWC	1350	8.37	311	311	--	7
8/13/11	--	--	--	--	--	--	--	--
8/14/11	--	--	--	--	--	--	--	--
8/15/11	--	--	--	--	--	--	--	--
8/16/11	8:55	NDSWC	1360	8.37	358	321	50	7
8/17/11	--	--	--	--	--	--	--	--
8/18/11	--	--	--	--	--	--	--	--
8/19/11	--	--	--	--	--	--	--	--
8/20/11	--	--	--	--	--	--	--	--
8/21/11	--	--	--	--	--	--	--	--
8/22/11	--	--	--	--	--	--	--	--
8/23/11	9:35	NDSWC	1380	8.44	290	290	--	7
8/24/11	14:00	NDSWC	1370	8.39	292	291	--	7
8/25/11	14:15	NDSWC	1380	8.44	284	289	--	7
8/26/11	--	--	--	--	--	--	--	--
8/27/11	--	--	--	--	--	--	--	--
8/28/11	--	--	--	--	--	--	--	--
8/29/11	13:40	NDSWC	--	8.37	277	286	--	7
8/30/11	9:00	NDSWC	--	8.37	279	283	79	7
8/31/11	9:15	NDSWC	--	8.11	283	281	--	7
<b>Minimum</b>			1,330	8.11	270	275	50	
<b>Maximum</b>			1,380	8.44	358	321	107	
<b>Average</b>			1,355	8.36	296	296	79	

OUTLET OPERATOR NAME/ADDRESS

NAME: ND State Water Commission  
 ADDRESS: 900 E Boulevard Avenue  
 Bismarck ND 58505

MONTHLY DISCHARGE REPORT

LOCATION: DOWNSTREAM OF THE OUTLET (BREMEN)

FACILITY: Devils Lake Outlet Project

MONITORING PERIOD	
START DATE	END DATE
8/1/11	8/31/11

LOCATION: Benson Co, ND

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.19	8.52	8.43	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1,420	1,640	1,563	umho/cm	Continuous	Recorder
SULFATE	329	438	403	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	329	422	390	mg/L	4 x Week	GRAB
FLOW, INSTREAM	147	454	262	cfs	Continuous	Recorder
SIGNATURE				9/30/11	701-328-4948	
NAME AND TITLE	JONATHAN KELSCH, HEAD, CONSTRUCTION SECTION			DATE	TELEPHONE NUMBER	

COMMENT AND EXPLANATION OF ANY VIOLATIONS

Summary of individual sample results and flow data for outlet, upstream & downstream monitoring locations attached.

Instream samples and measurements for this summary pertain only to time periods when outlet is actually operated.

NA - Not Available

**Average daily streamflow and conductivity data at the downstream location near Bremen  
USGS Gaging Station Data  
Sheyenne River Below Devils Lake Outlet near Bremen**

<b>Date</b>	<b>Streamflow (cfs)</b>	<b>EC (<math>\mu</math>S/cm)</b>
8/1/11	347	1560
8/2/11	296	1550
8/3/11	235	1510
8/4/11	173	1410
8/5/11	158	1370
8/6/11	179	1340
8/7/11	190	1360
8/8/11	206	1380
8/9/11	273	1450
8/10/11	377	1560
8/11/11	383	1560
8/12/11	395	1510
8/13/11	442	1500
8/14/11	441	1520
8/15/11	454	1540
8/16/11	402	1520
8/17/11	344	1530
8/18/11	315	1550
8/19/11	294	1560
8/20/11	269	1570
8/21/11	235	1570
8/22/11	209	1560
8/23/11	197	1570
8/24/11	186	1570
8/25/11	178	1580
8/26/11	174	1590
8/27/11	165	1600
8/28/11	160	1600
8/29/11	155	1620
8/30/11	150	1620
8/31/11	147	1630
<b>Minimum</b>	147	1,340
<b>Maximum</b>	454	1,630
<b>Average</b>	262	1,528

**Water Quality Results of the samples collected from the downstream location near Bremen  
 Sheyenne River Below Devils Lake Outlet Near Bremen**

<b>Date</b>	<b>Time</b>	<b>Sampler</b>	<b>USGS EC (<math>\mu</math>S/cm)</b>	<b>Lab pH</b>	<b>Lab Sulfate (mg/L)</b>	<b>7 Day Rolling Average of Sulfate for the operating period (mg/L)</b>	<b>Total Suspended Solids (mg/L)</b>	<b>No. of days included in the 7 day Rolling average</b>
8/1/2011	16:55	NDSWC	1570	8.34	415	377	--	7
8/2/11	10:00	NDSWC	1540	8.42	401	375	44	7
8/3/11	--	--	--	--	--	--	--	--
8/4/11	--	--	--	--	--	--	--	--
8/5/11	--	--	--	--	--	--	--	--
8/6/11	--	--	--	--	--	--	--	--
8/7/11	--	--	--	--	--	--	--	--
8/8/11	--	--	--	--	--	--	--	--
8/9/11	9:30	NDSWC	1420	8.36	329	329	--	7
8/10/11	17:05	NDSWC	1560	8.51	425	377	--	7
8/11/11	10:40	NDSWC	1560	8.52	425	393	--	7
8/12/11	9:45	NDSWC	1550	8.5	401	395	--	7
8/13/11	--	--	--	--	--	--	--	--
8/14/11	--	--	--	--	--	--	--	--
8/15/11	--	--	--	--	--	--	--	--
8/16/11	10:00	NDSWC	1520	8.41	438	422	29	7
8/17/11	--	--	--	--	--	--	--	--
8/18/11	--	--	--	--	--	--	--	--
8/19/11	--	--	--	--	--	--	--	--
8/20/11	--	--	--	--	--	--	--	--
8/21/11	--	--	--	--	--	--	--	--
8/22/11	--	--	--	--	--	--	--	--
8/23/11	10:05	NDSWC	1560	8.43	409	409	--	7
8/24/11	14:30	NDSWC	1580	8.52	401	405	--	7
8/25/11	14:45	NDSWC	1580	8.51	384	398	--	7
8/26/11	--	--	--	--	--	--	--	--
8/27/11	--	--	--	--	--	--	--	--
8/28/11	--	--	--	--	--	--	--	--
8/29/11	14:00	NDSWC	1620	8.47	394	397	--	7
8/30/11	9:35	NDSWC	1620	8.37	406	396	28	7
8/31/11	20:50	NDSWC	1640	8.19	406	398	--	7
<b>Minimum</b>			1,420	8.19	329	329	28	
<b>Maximum</b>			1,640	8.52	438	422	44	
<b>Average</b>			1,563	8.43	403	390	34	